MANUFACTURE OF SLIDE FASTENER CONTROL SLIDE STOP STUDS

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Inventor(s):
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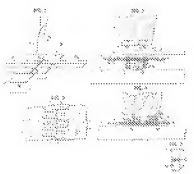
Abstract of **GB 1479997 (A)**

1479997 Sliding clasp fasteners SOC PRESTIL SA 6 March 1975 [12 March 1974] 9333/75 Heading E2S A method of making stop studs for the control slide of slide fasteners comprising coupling elements 5 in each row made of plastics filament forming a sequence of sinuous configurations such as hairpins or meanders, said filament being applied according to the type of elements either on a single face of the corresponding carrier tape 2 or straddlewise on both faces thereof, is characterised in that said stop studs are formed on one face of the carrier tapes 2, 2 by combining an additional external supply of plastics material to said one face with a partial flow, through the tapes, of plastics material constituting initially the coupling elements registering with each other on the other face of said tapes, and that in the case of a helix-type slide fastener, said additional external supply of plastics material is applied to the faces opposite those carrying said elements. According to the invention also the said application is carried out jointly with the application of pressure and localized heating or, instead of said heating, with the action of supersonic vibration in order to cause the plastics material of said coupling elements located on said other faces of said tapes to melt and flow through the texture of said tapes. As shown, a continuous fastener chain 5 with coupling elements 5 in the form of a plastics helical filament 1 secured to one face 2 of each carrier tape 3 of woven form, is fed, at intervals, in the direction F 3, Fig. 1, with its plain face 4 uppermost, along an anvil 7. During each stationary period of the chain 5 an end portion of a plastics rod 12 is fed from a device 13 across the chain in the direction F 3 whereupon a heated punch 6 is lowered onto the chain, the punch 6 having a sharp ridge 11 adapted to form a slit between the two moulded stop studs, and two cavities 10 into which the rod material is pressed to form the pair of stop studs 14 on the top surfaces 4 of the tapes 3. The tool 6 also melts the turns of the filaments thereabeneath which, due to the pressure of the tool, escape through the interstices, and meshes, of both of the tapes 3 in the form of irregular streamlets 15, Fig. 4, which thoroughly mix with the rod material The melted turns of filament remaining on the under face 2 of the tapes 3 form small plates 16- which are integral with the streamlets 15 and provide a riveting-type anchorage of the stop studs 14 The descending tool 6 first cuts off the rod end portion and then forms a slit between the two plates 16 The tool ridge 11 may be replaced by a shaped configuration, Fig. 6, to provide an oval recess 20, Fig. 8, which has a dual, not shown, to carry off excess plastics material The same procedure is carried out for tapes with meander type filaments (1a, 3a) which straddle the edges of the tapes (3a, 3a) Figs. 11-15, not shown The localised heating of the tool may be replaced by the action of supersonic vibration, the tape ends may be bone perforations formed therein, and the cutting ridge 15 may be omitted from the tool when the fastener chain is fed across the anvil in an open condition The melting points of the filaments 1 and the rod 12 should preferably be closely related.



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1 479 997

(19)

(54) IMPROVEMENTS IN OR RELATING TO THE MANUFACTURE OF SLIDE FASTENER CONTROL SLIDE STOP STUDS

(71) We, SOCIETE PRESTIL S.A., a Body Corporate duly organized according to the French laws, of 1 Avenue Rondu, Choisy-le-Roi, Val de Marne, France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates in general to slide fasteners and has specific reference to means for stopping the control slide or runner of such slide fasteners of the type wherein the coupling elements of each row consist of a plastics filament forming a series of sinuous configurations such as helices or coils, meanders or other convolutions.

In the first case (coils or helix configurations) the helix or spiral line formed with the filament is generally of the variable-pitch type to facilitate the sewing thereof to the corresponding carrier tape. In fact, in this case the filament is secured to one face of the tape of which the opposite face is free of any insert or complementary element. Slide fasteners of this character are symmetrical and generally referred to, as in the following disclosure, by the term "helix-type slide fasteners."

In slide fasteners of the second type (meander or "wimple" configuration) the filament is shaped to constitute a series of meanders disposed in two superposed planes. The element thus obtained is then fitted straddlewise to the corresponding carrier tape and sewn thereto. These fasteners are symmetrical and usually referred to, as in the following description, as "meander type slide fastener".

Many methods have already been utilized for manufacturing also from plastics material the studs provided at one end of slide fasteners of this kind for stopping their control slide or runner, a detachable or fixedly secured member being provided at the opposite end. All these prior art methods are directed to forming, on each side of the fastener, stop studs of adequate configuration projecting somewhat from the tape surface on which the coupling or interconnecting elements themselves are located. These studs may be obtained by either supplying additional plastics material or melting and shaping the material constituting the interconnecting or coupling elements at said one end. Some of these known methods contemplating the supply of additional plastics material utilize injection moulding techniques. Other methods, with or without the supply of additional plastics material, implement various high-frequency shaping techniques or supersonic wave shaping techniques.

Hitherto known methods of this type may be divided into two main classes:

(1) In a first class of methods the operation is accomplished on a closed fastener chain, i.e. a chain wherein the coupling elements are assembled with one another. A method based on this principle was disclosed for the first time in the German Patent No 1 064 895 and in the corresponding French Patent No. 1 213 431.

In fact, it is particularly advantageous for automatic transfer devices to operate on a closed fastener chain having a well-defined and constant shape, rather than on a partly closed and partly open chain of uncertain configuration.

This initial patent was followed by a relatively great number of other patents disclosing methods all based on an essential feature, namely the fact that a longitudinal median slit is formed between the stop studs whether these are added to or shaped from the elements.

(2) In the second class of methods of this type the operation is performed on an open fastener chain, i.e. a chain of which the coupling or interconnecting elements are disengaged, at least in the section where the stop studs are to be formed. However, in this case the above-mentioned advantage consisting in operating on a chain having a

well-defined shape and adapted to be easily and conveniently fed and presented under the working punch or other tool cannot be obtained.

However, in this case it is not required to form a longitudinal median slit between the stop studs since the latter are formed independently of each other.

It is the essential object of the present invention to provide a method of manufacturing the above-defined stop studs or like members, this method being directed mainly to improve the anchoring of said studs to the relevent carrier tapes while avoiding any possibility of undesired tear-off. In fact, this possibility still exists in the case of stop studs formed by supplying additional plastics material to the fastener, for in this last-mentioned case the additional material is attached to the carrier tapes only be mere adherence thereto. In the case of stop studs obtained by melting the material constituting certain coupling or interconnecting elements and shaping the thus molten material to constitute the desired stop studs, the risks of tearing off the studs are also considerable for the same reason.

It may be noted that the present method is applicable both to slide-fastener types mentioned in the foregoing, and also to the two classes of operating methods discussed hereinabove.

However, it will readily occur to those conversant with the art that the application of the method of this invention is greatly facilitated if the operation is conducted on a closed chain, for in this case the maximum benefit is derived from the advantageous features of the present method, as will be understood from the following disclosure.

According to the present invention, a method, of making stop studs for the control slide of slide fasteners comprising coupling elements in each row made of a plastics filament forming a sequence of sinuous configurations, such as helices or meanders, said filament being applied according to the type of elements either on a single face of the corresponding carrier tape of straddle-wise of both faces thereof, is characterised in that said stop studs are formed on one face of the carrier tapes by combining an additional external supply of plastics material to said one face with a partial flow, through the tapes, of the plastics material constituting initally the coupling elements registering with each other on the other face of said tapes and in that, in the case of a helix-type slide fastener, said additional external supply of plastics material is applied to the faces opposite those carrying said coupling elements, said application being carried out jointly with the application of pressure and localized heating or instead of said heating the action of supersonic vibration in order to cause the plastics material of said coupling elements located on said other faces of said tapes to melt and flow partially through the texture of said tapes and become an integral part of the added plastics material.

With this method, a surprising result is obtained in that the anchoring of the stop studs in the tapes is exceptionally strong, since the material constituting these studs becomes an integral part of the plastics material left on the opposite face of said tapes, due to the plurality of plastics threads having thus passed through these tapes. Of course, this result is made possible by the fact that the tapes, preferably consisting of woven material, have a texture which permits the flow of molten plastics material therethrough from one to the other face of the tapes. The anchoring action thus obtained is somewhat similar to a riveting performed on both sides of the tapes.

In the case of a helix or coil slide fastener, the additional plastics material necessary for constituting the stop studs is applied to the tape faces opposite those supporting the coupling or interconnecting elements of the slide fastener. However, in the case of meander-type fasteners, the addition of plastics material may be supplied indifferently on one or the other face of the carrier tapes.

Of course, this invention is also concerned with slide fasteners pertaining to these various types and wherein the end stop studs are formed according to the method of this invention.

Various features and advantages of the method of this invention will appear as the following description proceeds with reference to the accompanying drawings illustrating diagrammatically by way of example the manner in which the present invention may be carried out in actual practice. In the drawings:

Figure 1 is a diagrammatic perspective view illustrating the manner in which the present method is carried out in the case of a helix-type slide fastener;

Figure 2 is a fragmentary plan view from above of the top surface of this slide fastener, on which coupling or interconnecting elements are provided;

Figure 3 is a cross section taken along the line III—III of Figure 1 but on a different larger scale;

Figure 4 is a similar view showing the ultimate step in making the stop studs by means of the method of this invention;

Figures 5 and 6 are plan views from beneath of the working end of two different moulding and pressure tools or punches;

Figures 7 and 8 are fragmentary plan views from above illustrating one and the other faces of the fastener chain upon

completion of the stop studs;

Figure 9 is a cross section taken along the line IX—IX of figure 7;

Figure 10 is a longitudinal section taken along the line X—X of Figure 7, illustrating the control slide or runner of the corresponding slide fastener;

Figures 11 and 12 are views similar to Figures 3 and 4, respectively, illustrating the application of the method of this invention to a meander-type slide fastener;

Figure 13 is a fragmentary perspective view of one of the pair of rows of coupling or interconnecting elements of this type of fastener, and

Figures 14 and 15 are plan views from above showing one and the other faces of this slide fastener on which stop studs obtained by the method of this invention are formed.

As mentioned hereinabove, Figures 1, 2, 3, and 4 of the drawings illustrate the application of the method of the present invention for obtaining end stop means in a fastener chain of the coil or helix type while the chain is closed. This chain, shown only partially in Figure 2, comprises two rows of coupling or inter-connecting elements consisting each of a filament 1 shaped to a helix configuration and attached by sewing to one or the other face 2 of a pair of tapes 3 acting as support or carrier means therefor. The opposite face 4 of these carrier tapes is thus free of any insert or additional element. These tapes may as conventional consist of woven tapes of natural or synthetic textile fibres or yarns.

As clearly illustrated in Figure 2, each filament 1 constitutes a variable-pitch helix to facilitate the sewing of the fastener element to the tape. The sewing operation may be performed by using various sewing stitch types. These stitches are not shown in the drawings for the sake of clarity and if they are shown they are illustrated only in a very diagrammatic form.

Due to the specific configuration of the helix formed by means of each filament 1, the two sides of each turn or convolution are substantially superposed. The coupling elements 5 of each row are obtained through a distortion or an extra-thickness of the registering ends of the various turns or convolutions of each row.

In the example illustrated in Figures 1, 3 and 4 and according to the present invention, additional external plastics material is supplied to one of the two faces of the chain involved by using a moulding and pressure member consisting of a vibrating tool or punch 6 to which supersonic vibrations are applied.

This tool 6 has its axis disposed normally to a fixed plate 7 and the fastener chain designated in general by the reference numeral 8 is fed across the top surface of said fixed plate 7. The tool 6 is secured to, and carried by, a movable support (not shown) adapted to impart a movement thereto in the direction of the arrow F_1 for engagement with the chain 8 supported by said plate 7. Moreover, this tool is associated with a device receiving high-frequency electric current and adapted to impart supersonic vibration to said tool with a view to melt the mould and plastics material conveyed by the fastener chain.

The bottom or operative end 9 of tool 6 has two adjacent moulding cavities or impressions 10 formed therein for forming a pair of stop studs according to the method of this invention. When it is contemplated to perform this operation on a closed fastener chain, as in the example illustrated, these two cavities or impressions 10 are separated by sharp ridge or rib 11 adapted to form a slit between the two moulded stop studs so that the two halves of the chain remain independent of each other, as will be explained presently.

According to another feature for carrying out the present invention, the fastener chain 8 is disposed on said fixed plate 7 with the face 2 of its pair of companion tapes 3 supporting the two rows of connecting elements 1 directed towards the tool 6, as illustrated in Figure 3. Under these conditions, the plain face 4 of both tapes 3 is facing upwards, that is, towards the tool 6. Driving means (not shown) are provided for feeding this chain on the plate 7 in the direction of the arrow F_2, this movement being discontinued intermittently so as to stop in proper alignment with the tool 6 each chain location where a pair of stop studs for the fastener control slide are to be obtained.

An external supply of plastics material is obtained from a strip or rod 12 of thermoplastic material having its tip or free end disposed across the chain 8 and just beneath the operating tool 6. Driving means (not shown) cause this strip or rod 12 to move intermittently in the direction of the arrow F_3 from a feed system or device 13. This feed movement is such that after each moulding operation implying the picking up of the end portion of the strip or rod 12 which lies beneath the tool 6 the next end portion of the strip or rod 12 is brought under the tool, and so forth.

The stop stud forming device may advantageously consist of the one disclosed and illustrated in the French patent No 73.37690 filed on 23rd of October 1973.

In any case the moulding member must be able to exert a certain pressure against the end portion or free end of the strip or rod 12 and also on the underlying portion of chain 8. This application of pressure is attended by

the application of local heat or, as in the present example, by the internal action produced by supersonic waves or vibration directed to the plastics material, since such supersonic vibrations are applied to the tool itself. Therefore, during its downward stroke the tool 6 will cut off the underlying tip of end portion of strip or rod 12 and form with the material of said tip a pair of studs 14 which are consequently moulded on the top surfaces of the pair of tapes 3.

However, this moulding step is attended by the immediate melting of the plastics material constituting the turns or convolutions of the pair of filaments 1 aligned with the operating tool 6. This is due to the combined action of the tool pressure squeezing thse turns between the plate 7 and the tapes 3, and of the simultaneous local application of heat and/or of the supersonic vibrations transmitted through the tool 6.

Under these conditions, the plastics material constituting initially the fastener coupling element turns is caused to melt and, due to the pressure exerted by the tool 6, most of this material seeps and flow through the interstices and meshes of both tapes 3.

Finally, a very large proportion of this material combines with the molten material cut off from the tip of rod 12 and undergoing the moulding process, to eventually constitute the pair of stop studs 14. This result is illustrated theoretically and diagrammatically, by way of illustration, in Figure 4 of the drawings, in which the irregular or random "eddies" 15, in thick lines, designate the threads of plastics material resulting from the melting of turns 1 which passed through the tapes 3 and eventually mixed up with the material fed to the top surface 4 thereof. In fact, the plastics threads having thus passed through the tapes may be considered as forming "eddies" or like irregular streamlets within the material constituting the pair of stop studs 14.

However, one fraction of the material resulting from the melting of the corresponding turns of both elements 1 remains squeezed between the plate 7 and the tapes 3, thus constituting a pair of tiny final plates 16 emerging from the corresponding surfaces of the tapes 3.

The effect of the flow through the pair of tapes of a considerable fraction (generally the majority) of the material resulting from the melting of the corresponding turns of both filaments 1 was evidenced during practical tests which led to the present invention and which utilized an additional supply of clear-coloured plastics material applied to the surfaces 4 of tapes 3, whereas the two filaments 1 constituting the coupling or interconnecting elements of the corresponding fastener consisted of dark-coloured plastics material.

When the method of this invention was actually tested on current production lines, the presence of "eddies" of dark material was observed within the stop studs of clear material. These eddies therefore consisted of one portion of the plastics material constituting initially the corresponding turns which had flowed through the tape material.

As a consequence of this specific action, the pair of stop studs 14 thus obtained are anchored very safely and deeply in the tapes, since one fraction of the plastics material initially laid on the opposite face flowed through the tapes and became an integral part of said studs 14. If the added material, i.e. the material constituting the rod 12, is of same composition as the material constituting the two filaments 1, these two materials are thoroughly mixed up, so that the resulting material forms a single and integral body. In all cases, the anchoring of the stop studs 14 is somewhat similar to riveting since these studs are an integral part of the small plates 16 formed on the opposite surface of the tapes, as a consequence of the great number of plastics filaments filling the interstices and meshes of the textile material constituting the tapes 3. Under these conditions, the stop studs 14 thus obtained cannot be torn off under any circumstances in actual service.

Now, although these stop studs are located on the tape surfaces opposite those carrying the interconnecting elements 5, they are nevertheless capable of efficiently performing their function as stop means for the control slide 17 to be subsequently fitted to the corresponding fastener.

In fact, as shown in Figure 8, said stop studs 14 will stop the lips of the lower plate 18 of said slide 17 which registers with the plain faces 4 of both tapes 3, instead of stopping the plate 19 of said slide which registers with the rows of coupling elements 5 of the slide fastener.

It may also be pointed out that when moulding the pair of stop studs 14 the edge 11 of tool 6 will firstly cut the end portion of the rod 12 of additional plastics material into two sections constituting the pair of studs 14, whereafter it will cut the longitudinal slit between the two plates 16 formed on the opposite surface. This is necessary to separate the two portions of the slide fastener, since in the example illustrated the method of the present invention is applied to a slide fastener chain in its closed condition. However, the cutting edge or rib 11 may be given any other suitable configuration. Thus, the rectilinear cutting rib 11 illustrated in Figure 5 may be replaced by an annular ridge 11a forming a loop on itself and surrounding a central aperture 20 formed in the operative or lower end 9a of

tool 6 and connected to the outside via an oblique passage formed in the tool body. With this arrangement, any excess of plastics material filling the inner space of the annular rib 11*a* can be discharged therefrom.

Of course, this cutting rib or material-removing ridge is not required in cases whereby the method of this invention is applied either to a pair of rows of coupling elements prior to the assembling thereof, or to a single row of elements. But in this alternative the advantages resulting from the application of the present invention to the preceding case, as far as the guiding of said rows is concerned, would not be obtained.

As already mentioned in the foregoing, the method of this invention is also applicable to slide fasteners of the meander type. This application is illustrated in Figures 11 and 12 of the drawings.

In this case, one or the other faces, indifferently, of the corresponding fastener chain 8*a* is disposed on the plate 7*a*, since each one of the two faces of the carrier tapes 3*a* comprises meanders consisting of the filaments 1*a* constituting the coupling elements 5*a*.

However, the same procedure as in the preceding cases is applied since additional plastics material is supplied by using a strip or rod 12 having its tip or free end disposed across the top of chain 8*a* and in proper registration with the operating tool 6 to which supersonic vibrations are applied. During the downward stroke of tool 6 the latter will cut off the end portion of the strip or rod 12 to provide two stop studs 14*a* laid upon the registering surfaces of both tapes 3*a*.

Naturally, the meanders of filament 1*a* disposed on the same surfaces and facing the tool 6 are embedded in the thus moulded stop studs 14*a*. But at the same time the meander material on the opposite face of each tape is squeezed by the pressure exerted by the tool and this material is thus caused to melt and flow through the interstices and meshes of said tapes. Thus, this material will mix up with the material supplied for forming the pair of stop studs 14 and eventually becomes an integral part thereof in the same manner as in the preceding case. However, one fraction of this material remains on the face of said tapes 3*a* to form a pair of thinner plates 16*a* similar to the plates 16 obtained in the preceding case.

Therefore, exactly the same effect as in the preceding example is obtained with the only difference that the stop studs 14 incorporate some of the meanders formed in said filament 1*a*. However, the studs 14 are anchored with the same force and reliability as in the preceding example, due to the phenomena explained hereinabove.

Of course, the device for carrying out the method of this invention which is described and illustrated herein is given by way of example only and should not be construed as limiting the present invention. In fact, instead of a tool to which supersonic vibrations are applied, one may also use a moulding punch heated by electric resistances or any other suitable and known means. Furthermore, it is also possible to use a non-heated moulding punch by combining the pressure exerted by said punch with a local heating of the additional plastics material and also of the material constituting the turns, convolutions or meanders 1 or 1*a* of the slide fastener.

In any case, it is advantageous that the plastics material thus added be relatively compatible with the material constituting the slide fastener coupling elements 5. More particularly, these materials should preferably have close melting points. At any rate, it is preferable to avoid any incompatibility between these materials.

As already mentioned hereinabove, if the additional plastics material is of same nature or composition as the material constituting the fastener filaments, these materials will mix up intimately, or more exactly the stud material will melt with the material having flowed through the tapes.

To facilitate this action, the tape texture may be selected among those leaving adequate or propitious interstices and gaps between the meshes. Possibly, a series of fine perforations may be made through the marginal portions of the tapes which are to receive the molten plastics material. In this case, the perforations may be formed beforehand as a preliminary step on said tapes, i.e. before the fastener filaments are fitted thereto, or alternatively subsequent to this last-mentioned operation.

Of course, many modifications and variations may be contemplated in the practical embodiment of the invention without departing from the scope of the invention as defined in the following claims. The shape of the stop studs obtained with the method of this invention may vary or depart from the shapes shown by way of example in the drawings, which are given for illustrative purpose only.

WHAT WE CLAIM IS:—

1. A method, of making stop studs for the control slide of slide fasteners comprising coupling elements in each row made of a plastics filament forming a sequence of sinuous configurations, such as helices or meanders, said filament being applied according to the type of elements either on a siagle face of the coresponding carrier tape

or straddlewise on both faces thereof, said method being characterised in that said stop studs are formed on one face of the carrier tapes by combining an additional external supply of plastics material to said one face with a partial flow, through the tapes, of the plastics material constituting initially the coupling elements registering with each other on the other face of said tapes, and in that, in the case of a helix-type slide fastener, said additional external supply of plastics material is applied to the faces opposite those carrying said coupling elements, said application being carried out jointly with the application of pressure and localized heating or, instead of said heating, the action of supersonic vibration in order to cause the plastics material of said coupling elements located on said other faces of said tapes to melt and flow partially through the texture of said tapes and become an integral part of the added plastics material.

2. A method, according to claim 1, characterised in that it is carried out by using a moulding and pressure tool mounted for movement normally to a fixed base plate over which a fastener chain is caused to travel in the closed or open condition, said fastener chain being so disposed that the tapes carrying the coupling elements of the fastener contact said fixed plate.

3. A method, according to claim 2, characterised in that the pressure exerted by means of said moulding and pressure tool, or the stroke of said tool, is such that one portion of the plastics material resulting from the melting of said coupling elements is squeezed against said fixed plate to form small plates against the corresponding face of each tape, so that each small plate aforesaid becomes an integral part of the stop stud moulded on the opposite face of the corresponding tape, due to the relatively great number of minute plastics threads flowing through the tape texture.

4. A slide fastener chain of which the coupling elements of each row consist of a plastics filament forming a sequence of convolutions, for example of helix or meander configuration, said filament, according as its shape is of the helix or meander type, being applied to one face of each carrier tape, or straddlewise to both faces thereof, said fastener chain being characterised in that both rows of coupling elements are provided with stop studs for stopping the control slide of the fastener, said studs being formed by carrying out the method claimed in any one of the preceding claims.

5. A method, according to claim 1, substantially as described hereinabove and illustrated in the accompanying drawing.

6. A slide fastener chain substantially as described hereinabove and illustrated in the accompanying drawings.

For the Applicants,
CHATWIN & COMPANY,
Chartered Patent Agents,
253, Gray's Inn Road,
London, WC1X 8QX.

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Fig.1

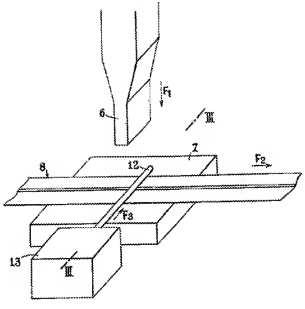


Fig.2

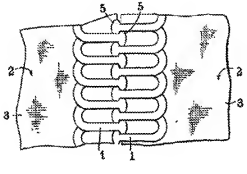


Fig.3

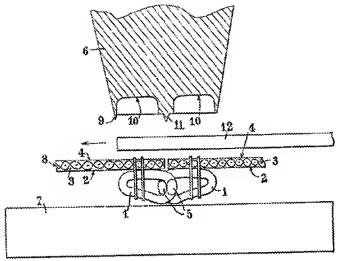
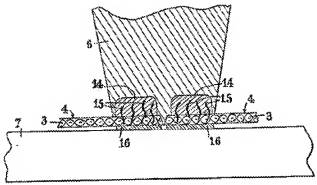


Fig.4



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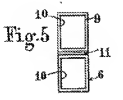


Fig.5

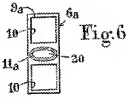
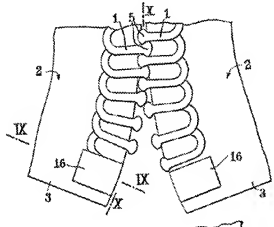


Fig.6

Fig.7



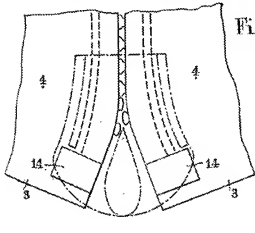


Fig.8

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Sheet 4

Fig. 9

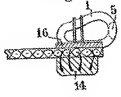

Fig. 10

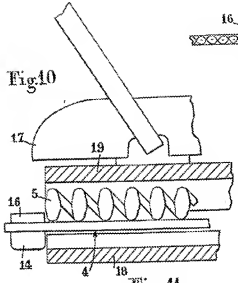

Fig. 11

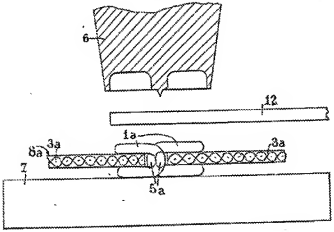

Fig.12

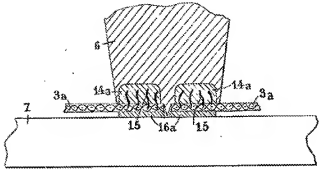

Fig.13

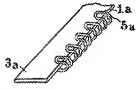

Fig.14

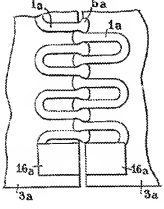

Fig.15